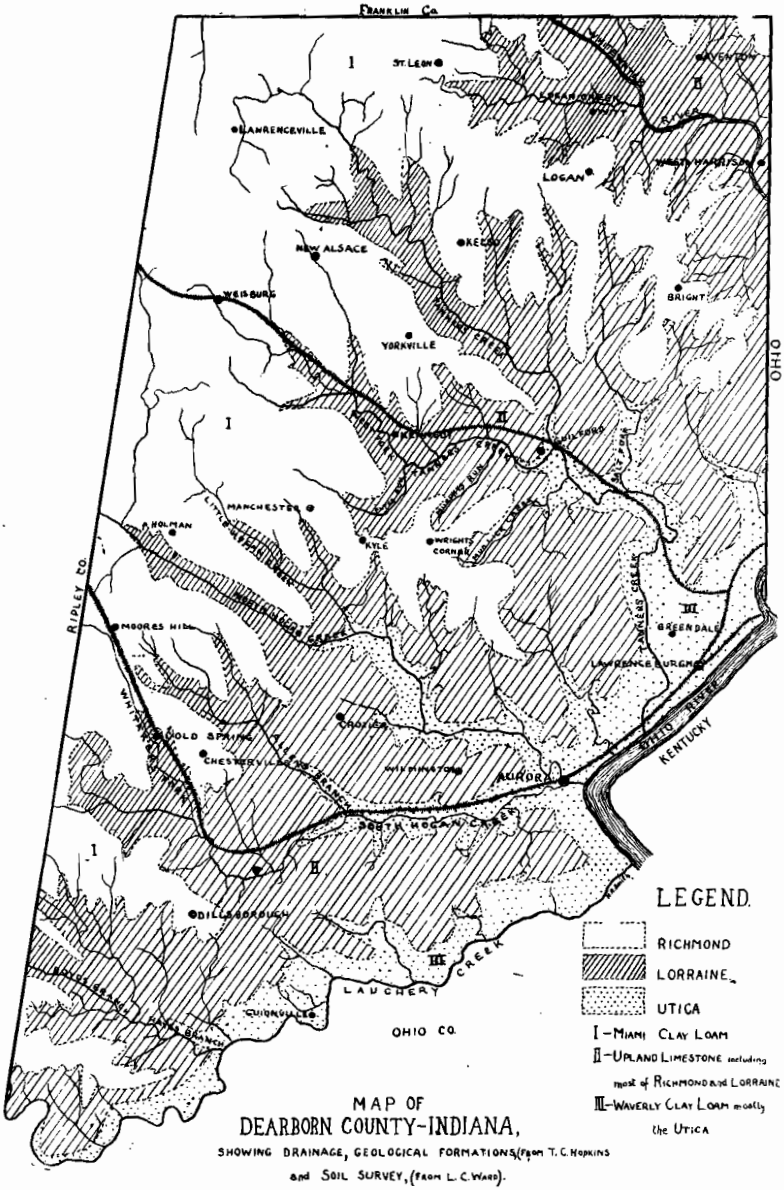


MAP OF
DEARBORN COUNTY-INDIANA,

SHOWING DRAINAGE, GEOLOGICAL FORMATIONS (from T. C. Hopkins and SOIL SURVEY, (from L. C. Ward).

Geology of Dearborn County.

By A. J. Bigney, President Moores Hill College.

Historical Statement.

Dearborn County was named in honor of Major-General, Henry Dearborn, Secretary of War, under Thomas Jefferson. It was carved out of the northwest Territory. When Indiana Tertriory was organized in 1800, the western boundary of the present county of Dearborn was a part of the old Indian Boundary Line.

In 1802, Ohio was admitted into the Union as a state. The boundary was moved east to the mouth of the Miami River, thence, north, which is now the boundary between Indiana and Ohio. and thus, the eastern boundary of Dearborn County. The people who settled in the County came mostly from Virginia, Ohio, and Kentucky, as early as 1796, and settled on the bottoms, north of Lawrenceburg, along the Miami, and on the present site of Lawrenceburg and Aurora. The county was organized March 7, 1803.

Location and Size.

Dearborn County is located in the southeastern part of the state, bordering on the Ohio River, eighteen miles below Cincinnati. Its area is 309 square miles. Its length is 26 miles and its breadth 16 miles.

Topography.

Dearborn County is drained by the tributaries of the Ohio River. On the south the Laughery Creek forms the boundary and drains that part. It empties into the Ohio River, two and one-half miles south of Aurora. About six miles to the north and running nearly parallel with Laughery Creek is South Hogan, which empties into the Ohio at Aurora. The B. & O. S. W. R. R. follows it to Aurora. Between these creeks is a ridge of good farming land. Flowing from this ridge, from either stream, are numerous branches. About eight miles further north, measuring on the west side of the county, is North Hogan, which joins South Hogan at Aurora. About the same distance to the north is

Tanner's Creek. The Big Four follows it much of the way to Lawrenceburg. The northeastern part of the county is drained by the great Miami River, the main Indiana branch, being the Whitewater. With so many streams of various sizes it is plain to see the county is very hilly, no part of the county having much level land.

These streams, necessarily, have formed narrow deep valleys with steep slopes and usually with a rapid fall. The Ohio River has cut a gorge on the east side of the county about 400 feet deep. The bluffs, thus overlooking the river, present most picturesque ridges. From Laughery to Aurora the bluffs are close to the river, there being some alluvial land widening on approaching Laughery. Above Aurora, the bluffs gradually recede from the river, thus making extensive bottoms between Aurora and Lawrenceburg nearly two miles wide. These hills continue up the river and join those bordering the Miami River. At the B. & O. S. W. depot at Aurora, the elevation above sea level is 490 feet. Advancing up the creeks from the Ohio the ridges decrease in elevation until the level uplands are reached on the western border of the county at an elevation of 918 feet at the Moores Hill depot, and at Milan, just beyond the county line, 985 feet, and at Sunman, Ripley County, 1014 feet. The fall on Tanners' Creek in 16 miles is 400 feet, and on the Hogan Creeks, 425 feet in the same distance.

Geology.

Dearborn County is located on the western slope of the Cincinnati arch, not far from its center. The slope is so slight that it is not readily detected. Previous to this uplift this section of the state was a part of the Inter-Palaozoic Sea. Conditions were favorable, sometimes, for the formation of extensive strata of limestone, while at other times, beds of shale were deposited. As these strata arose from the ocean, erosion began which has continued through the countless ages to the present so that this region has become topographically mature in its drainage as exhibited in the discussion of the Topography of the county.

To give the reader an idea of the relation of this region to the other geological formations a resumé for central North America of the legends is here given:

Archaeozoic—The oldest rocks, outcropping mostly in Canada north and east of the Great Lakes.

Proterozoic—Next in age, in the region of Lake Superior.

Palaeozoic—Following and outcropping in the greater part of the Mississippi valley.

Cambrian—The oldest of the Palaeozoic strata in the region of the Great Lakes.

Ordovician—Next in age, in adjacent parts of Ohio, Kentucky and Indiana, known as the "Ordovician or Silurian Island".

Canadian—The oldest of the Ordovician rocks in southern Canada.

Mohawkian—In New York as Trenton, and also near Patriot, Indiana.

Cincinnatian or Hudson River—In the region of Cincinnati.

Utica—Lowest along Ohio River and in the beds of inflowing streams.

Lorraine—Above the Utica.

Richmond—On the highlands in western part of Dearborn County.

Silurian—Formations west of the Ordovician, beginning on Laughery Creek.

It will be noted that Dearborn County is covered with strata belonging to the Cincinnati division. This indicates that the region is very old, considered from a geological standpoint.

The subdivisions—the Utica, Lorraine, and Richmond will now be considered in detail.—

The Utica strata consists of shales, blue in color, containing relatively few fossils, interstratified with thin beds of impure limestone. These shales at the Ohio River are the lowest and are about 40 feet thick. The Utica shales may be traced up Tanner's Creek and the Hogans about 10 miles and up Laughery about 16 miles. These shales are found in the bottom of the creeks and is commonly spoken of as blue clay. Much of this clay is quite pure and may be used for making anti-phlogiston.

The Lorraine lies directly above the Utica and consists of shales and limestones similar to the Utica, but with more limestone—the strata being thick enough to be useful for road building. The hills overlooking the Ohio are capped with Lorraine limestone—the greatest thickness being 260 feet.

The Richmond formation covers the western part of the county and consists largely of limestone with thin beds of impure clay interbedded. Much of this limestone has decayed, thus helping to form new soil. Fossils abound in this limestone, rendering it so brittle that it has no economic value. Its thickness is about 65 feet.

Economic Geology.

From an economic standpoint, Dearborn County is not as important as many counties in the state, yet this feature must not be undervalued. Since the development of the county depends very largely upon the condition of the roads, it is worthy of special mention that the county is rich in the materials for building roads. Limestone abounds in most parts. The mantle soil is from five to fifteen feet in thickness. Where much erosion has occurred the outcropping limestone is easy of access. Along all the creeks an abundance of fragmentary rocks are accessible for roads and concrete work. In many parts of the county quarries have been opened for furnishing the material for building pikes. The distance that the stone must be hauled figures quite largely in this industry. The past ten years has witnessed a marked increase in the mileage of pikes constructed. The increase in the use of automobiles has made a greater demand for good roads. The automobile has really solved the problem of the roads. The people are now willing to pay the price of good roads. With the material at hand the roads in time will be made. No building stone of any consequence is found, except for cellars and foundation purposes. The thickness of these stones varies from four to eight inches with occasional strata a little thicker.

Another kind of material that is valuable for roads and all kinds of concrete work is the sand and gravel. Along almost every creek, especially along the larger ones there is considerable, sand and gravel. The quality is not very high, for it is mixed with much clay. There is not enough of this material to supply the demand. Along the Ohio River is to be found the most extensive beds of gravel, sand, and silt, usually somewhat stratified. Some of these beds are twenty-five feet in thickness, and covering several acres. In many of the beds the material is too fine for the roads, thus making it necessary to sift it. The best quality of sand is taken from the Ohio River bed. A detailed report of the road material of Dearborn County is given in the Indiana Geological Report of 1905.

A number of deep wells have been driven in different parts of the county. On the Fair Grounds at Lawrenceburg a little gas was found, but of short duration. In Aurora, near the South Hogan Creek wagon road bridge an artesian well existed for a number of years. The water was of medium medicinal quality and was much used for such purposes. The most successful artesian well is at Dillsboro. It is 1,387 feet deep but the initial pressure is not great enough to force it to the surface by about 300 feet. So valuable is the water that a Sanitarium has been built and the people are going there in large numbers to get the benefit of its healing powers. The analysis of its water is as follows:

	To each Imperial Pint.
Sodium Chloride	18.6 grains
Calcium Chloride	8.1 grains
Magnesium Chloride	20.0 grains
Sodium Sulphate	31.2 grains
Aluminum Sulphate	8.1 grains
Magnesium Sulphate	7.5 grains
Calcium Bicarbonate	7.0 grains
Free Carbonic Acid Gas	00.0 grains
Total	100.5 grains

No metals of any consequence have been found in this county. In a few places the rocks and soil are sufficiently rich in bog iron ore to form a coating on the water flowing from such beds. The inexperienced think this is oil coming from the ground, indicative of the presence of oil in paying quantities. A number of years ago a piece of native copper, weighing about 26 ounces, was found near Weisburg. It must have been brought down from the Lake Superior region in the glacial drift.

Along Laughery creek, about seven miles from the Ohio River, small quantities of gold have been found in the glacial drift. One man obtained eight dollars worth and another sixteen dollars worth. It occurred in the form of dust, fine scales and minute nuggets. More could, no doubt, be obtained if any one cared to wash the drift. This gold also must have come from the Lake Superior region.

PALAEONOTLOGY.

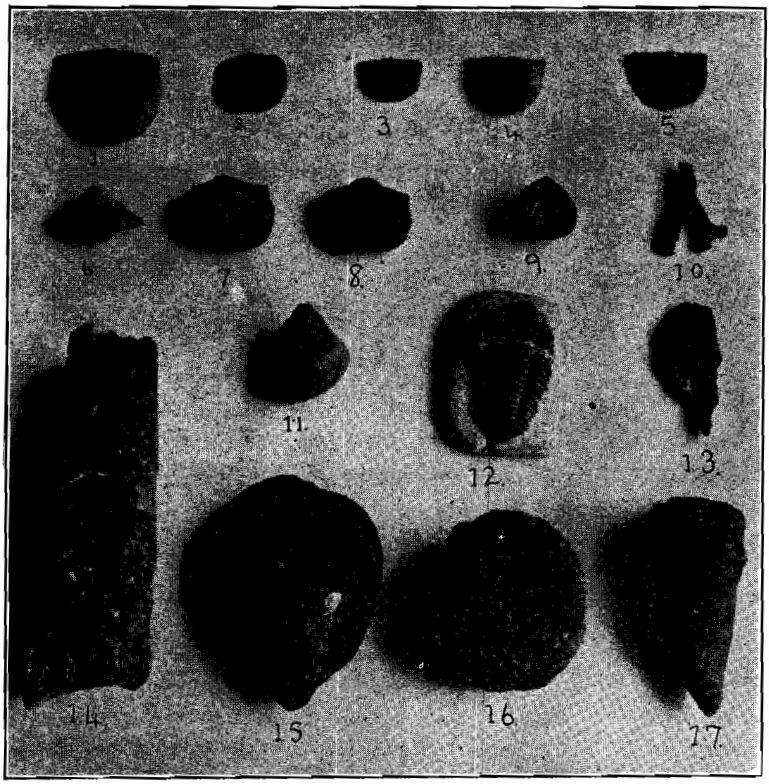
It is not within the province of this paper to give an exhaustive study of the fossils of the county. The purpose is to give such

information as will be most helpful to those with limited training in such subjects. The Ordovician rocks are noted for their richness in fossils. In fact, the fossils are so abundant that the rocks are rendered soft and brittle and unfit for economic uses, except in certain strata. The rocks above the Silurian rocks, outcropping in Ripley County, a few miles to the west, have but few fossils, hence they furnish much good building stone as is seen in the Osgood quarries. Even the inexperienced, with superficial observation, is impressed with the abundance of such structures. They naturally raise the question, "What are these fossils, and whence came they?" One must bear in mind that at one time this region was all under ocean water and this sea was rich in plant and animal life. In due time these organisms perished and being covered with sediment would degenerate slowly. At the same time, stony material, such as limestone, compounds of iron, or quartz in solution would replace the original tissue of the plant or animal, thus causing them to become rock-like. Thus, we say the organisms have become petrified, which word means "made into stone", not actually changed to stone, as many people think, but the stony material replaces that of the original tissue. The "shells" that are found in the rocks are these petrified forms which are called by the geologists "fossils".

To understand these fossils, one must know something about botany and zoölogy. Not many fossil plants are found in these rocks, hence only the animals will be considered. The leading groups of animals represented in Dearborn County are the corals, echinoderms to which the starfish belong, the brachiopode, which are forms with two shells placed together, resembling the mussels in our creeks, but much smaller, the bryozoa, which appear as branched forms or incrustations with many minute openings, mollusks, including snails, mussels, and nautiloid forms, and trilobites which are relatives of our crayfish.

On the accompanying plate are given a few of the typical fossils of the county so that even the amateur may be able to recognize the group to which each belongs.

Those who are interested in a detailed description of the fossils of the county, see 32nd Indiana Geological Report, Page 688, article by E. R. Cummings.



1. A Brachiopod—Strophomena vetusta.
2. A Brachiopod—Strophomena sinuata.
3. A Brachiopod—Leptaena rhomboidalis Wilckens.
4. A Brachiopod—Strophomena planumbona—Hall.
5. A Brachiopod—Strophomena planumbona—Hall. Inside view.
6. A Brachiopod—Platystrophia acutilirate.
7. A Brachiopod—Platystrophia lynx Eichwald.
8. A Brachiopod—Herbertella occidentalis Hall.
9. A Brachiopod—Rhychotrema capax.
10. A Brychzoan—Callopora ramosa d'Orbigny.
11. A Mollusk—a Gasteropod—Clathospira subconica—Hall.
12. A Tribolite—Calymmene Callicephala Green.
13. A Bryozoan—Monticulipora mammulata.
14. A Cephalopod—Orthoceras Carleyi Hall.
15. A Mollusk—a Pelecypod Allonychia jamesi Meek.
16. A coral—Favistella Stellata—Hall.
17. A cup coral—Streptelasma rusticum Billings.

Soils.

The soil of Dearborn County is somewhat varied. The bottoms or alluvial deposits are rich and productive, while the hill lands are rich in possibilities but not so productive. I say rich in possibilities, because many of the fundamental elements are present in great abundance but it requires additions for making these available and then it is very productive.

The soil consists of sand, clay, gravel, limestone, and organic substances. The sand has been derived from the granitic rocks, the gravel from similar sources, the limestone has been made by the animals of the ancient ocean, and the organic substances from the plants and animals of the present.

The soils in the county are divided into three classes by C. W. Shannon in the thirty-second Geological Report of Indiana:

I. The Limestone Upland Soil.
II. The Miami Clay Loam.
III. The Waverly Clay Loam.

I. The Limestone Upland soil is located on the hills, ridges and highlands in the western part of the county. Probably two-thirds of the county is covered with this soil. It consists of the decayed limestone and the shale between the layers of limestone. There is more of the shale on the slopes. The limestone is not completely decayed, there being much of it in the fragmentary form. These fragments are so abundant, especially on the hillsides, that the farmers use them for making fences and for building roads and foundations for buildings. The farmers are also crushing it and using it to destroy the acidity of other soils. Most of the creeks are well filled with these fragments. This stone is rich in fossils and these make it decay more rapidly. This soil is kept largely free from acid and thus it becomes a very valuable soil for most crops, especially fruits of various kinds.

II. The Miami Clay soil is found in the northwestern and western part of the county adjoining Ripley County, where most of the land consists of this kind of soil, especially east of Laughery. It is light in color and quite firm and compact until altered by drainage and cultivation. The "crawfish flats" as this land used to be called is rapidly changing under modern farming. The subsoil often contains sand, gravel, and little concretions of iron and clay. It is mottled with blue, red, and white materials. Beech and sweet gum trees characterize such soil. It is well adapted to

grass and wheat, and when fertilized with clover or barnyard manure or other good fertilizer, produces large crops of corn as well as a great variety of fruits. It holds moisture unusually well, but it must be properly drained. No section of the state has been improved more than this Miami Clay soil. Twenty-five years ago, the farmers on this land could scarcely make a living, but now they are rapidly increasing in wealth.

III. The Waverly Clay Loam is located along all the creeks in the bottoms and chiefly along the Ohio River, between Aurora and the Miami River. In this region more than 7,000 acres are covered with this soil. For the most part it is very rich and productive. It consists of a sand and gravel bed, probably of glacial origin. The surface soil consists of clay, fine sand with some limestone, brought down from the hills, small pebbles, and much humus. This is particularly good for corn and truck farming.

Conservation of the Soil.

Twenty-five years ago most of the hilly land was heavily timbered. Since then, however, the greater part has been removed and the land put under cultivation.

This is where the serious mistakes have been made. Year after year, the hills were planted in corn, barley and wheat. The ground was thereby kept loose and the rains eroded it and transported this rich soil to the valleys below, thus enriching them. As the forests were cleared away the erosion increased, until at the present time the rich black soil is largely removed from the hills and the clay beneath it is now being eroded very rapidly and this new soil is being tranpsorted to the bottom land and deposited upon the rich soil, previously deposited. This not being mixed with humus is not very productive. This is seen on the large bottoms of the Ohio and Great Miami. Twenty-five years ago those alluvial plains produced corn in an extraordinary way, but today their productiveness has greatly decreased.

It is plain to see that the farmers on both the hill lands and also the bottoms have suffered great losses on account of this unfortunate method of procedure. Many of the landowners have seen the error of their way and are changing their method of farming. Alfalfa is now being sowed, and this is protecting the land and at the same time is rendering large profit. Others are sowing to blue grass and using the land for pasture—another wise and productive plan. Still others are setting out locust plants

and in this way they are protecting the land and providing for the future realization of profit. Much of the waste land in the county could very profitably be used in this way. Others are clearing away the little timber that remains and planting this to tobacco, year after year, and in this way the wasting of the land continues.

A large per cent of the farmers have never realized the real value of their land. They have so much of it that it makes very little difference to them even if some of it is going to waste. The time is coming when this county will be more densely populated, and someone will be compelled to reclaim this land waste. Many are so selfish that they do not care; but is this a sensible way in which to act?

The greater number of the landowners do not consider how important the soil is They fail to realize that mankind must look to it as a source of sustenance.

If we could look into the future more and try to see the coming needs it would be better for the present as well as the future generations.

Glacial Drift.

Dearborn County seems not to have been invaded by the Glaciers, except along the eastern border. Important moraines occur along the ridge of hills from Elizabethtown to Lawrenceburg and for several miles along the hills north of Laughery creek. In the latter position are the deposits in which gold has been found. Almost opposite the mouth of Laughery Creek on the Kentucky side of the Ohio River is the famous glacial deposit known as "Spiltrock". This is a terminal moraine of a lobe of an ancient ice-sheet which extended down the Miami valley past Lawrenceburg and across the Kentucky bottoms below Petersburg, Ky. The old course of the Ohio River may be seen along this line. Standing at Splitrock one can readily observe this, and that the river has been gradually shifted westward until it reached the ridge of hills at Aurora which is its present position. Although Splitrock is not in Dearborn County, yet it is the main glacial deposit and directly connected with that in the county.

In addition to the moraines along the eastern border there are glacial boulders scattered over the county, here and there, consisting of rocks having the same composition as rocks of the Great Lake region. Some of these are two to three feet in diameter, but most of them are less than one foot. Most of the clay and

especially the light colored clays have undoubtedly been derived from these drifts.

The southeastern part of the State is spoken of as the Loess Area because of this light colored soil.

ARCHÆOLOGY.

That Dearborn County was inhabited by a race of people before the Indians came is evidenced by the mounds located within and near its borders. One is located on the ridge south of Guilford overlooking the Tanner's Creek valley. This mound has never been opened. Another is on the ridge on the north side of North Hogan Creek, one and one-half miles north of Moores Hill. It is about thirty feet in diameter and six feet high. It was opened by a party from Moores Hill College but nothing was found. Just over the state line in Ohio is a mound ten feet high and twenty-five feet in diameter. This has not been opened. The most prominent mound is on the eastern side of the Miami River, overlooking the B. & O. S. W. R. R., not far from the Miami River railroad bridge. The hill on which it is located is called Fort Hill.

The view from this place is most picturesque. The panorama that stretches out before one lies in three states—Ohio, Kentucky, and Indiana. Those who chose this site must have had some love of nature, but this was evidently not the real reason. To them, protection from their enemies, was without doubt the true purpose. This is not a conical mound but it is built like a fort. It consists of a ridge of earth on the top of the hill where the slope down to the Ohio Miami valleys is very steep, thus insuring good protection. The earthwork is still from six to eight feet in height, and incloses about twenty acres. On the eastern side is a gateway.

Near Aurora there are several small mounds, and one was within the city limits but it has been removed. Some thirty years ago, a mound was opened near the mouth of Laughery, 100 feet in diamater and fifteen feet high. In it was found an earthen pot with some fragments and also some human bones.

Near the Ohio state line a number of human skeletons were found where some men were excavating for the foundation of a barn. The skeletons were lying at intervals of about thirty inches, with their heads toward the west, facing the east. Nearby other skeletons have been found. On the bottoms, as far as Aurora, skeletons have been found, thus indicating that there must have been a rather dense population.

These were the people commonly called Mound Builders. Who they were is not certainly known. The Indians never seemed to have lived in the bottoms but would come there on their hunting or warring expeditions.

Relics of various kinds have been found in different parts of the county. Many different kinds of arrow points occur. In fact, these constitute the chief relics. Where these occur there are indications of a camp or village. These flints have been made from the quartz rocks that occur in some localities.

Mr. George W. Turner, a prominent farmer near Moores Hill, formerly Recorder of Dearborn County, has been a collector nearly all his life. He has probably done more work in this line than any other man in the county. I here give a brief summary of his work as a collector. He reports as follows:

"I have about 2,000 specimens in my collection of Indian relics. Out of this number about 900 specimens have been found in Dearborn County, namely: arrow points, one-half inch to seven and one-half inches in length; spears, flint-knives, three and one-half to six inches; spades, five to ten and one-half inches long; celts and axes, grooved and ungrooved; slate ornaments; pipes, pottery, flint drills, and many other articles of unknown use. In August, 1898, we opened a mound on Orchard Knob in Lawrenceburg Township, this county. From this mound I found one Copper Drill, one Breast-plate, one South Sea Island shell, and many other articles. In 1897, the same workmen, while removing a gravel bank on the Tebbs farm near Lawrenceburg, Indiana, unearthed forty-two fine notched leaf-shaped flint implements from a cache, two feet square, which I now have in my collection".

The mastodon of the Pleisotcene period must have roamed down the Ohio and Miami Valleys for parts of their skeletons have been found. On the bottoms above Lawrenceburg, a part of the osinnominatum was found well preserved, and is now in the Museum of Moores Hill College. At Big Bone Lick, in Kentucky, the skeletons of many mastodons have been taken, so it seems that this entire region must have been the homes or at least the feeding grounds of these wonderfully interesting animals of the ancient times.